Code : 1GC31 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Mathematics-II

(Common to CE & ME)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

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1. a) State Cayley-Hamilton theorem. Also verify it for the matrix $A=\begin{bmatrix}4 & -6 & -6\\ 0 & -2 & 0\\ 1 & -1 & -1\end{bmatrix}$, and hence find A^{-1}. 7M

   b) Diagonalize the matrix $A=\begin{bmatrix}1 & -1 & 0\\ -1 & 0 & 1\\ 0 & 1 & -1\end{bmatrix}$. 7M

2. a) Obtain the Fourier series for $f(x)=e^{-x}$ in the interval $0<x<2\pi$. 7M

   b) Express $f(x)=x$ as a half-range cosine series in $0<x<2$. 7M

3. a) Form the partial differential equation by eliminating the arbitrary function(s) from $z=x^2f(y)+y^2g(x)$. 7M

   b) Solve : $\frac{\partial^2 z}{\partial x^2}-2\frac{\partial z}{\partial x}+\frac{\partial z}{\partial y}=0$ by the method of separation of variables 7M

4. a) Using Newton's forward interpolation formula, find y at x=8 from the following data: 7M

x:	0	5	10	15	20	25
y:	7	11	14	18	24	32

   b) Find an appropriate root of the equation $x^3+x-1=0$ using the method of false position.

5. a) Obtain Picard's second approximate solution for the initial value problem 7M

   $$\frac{dy}{dx}=\frac{x^2}{y^2+1},\ y(0)=0.$$

   b) Given $\frac{dy}{dx}=x^2(1+y)$ and $y(1)$=1, $y(1.1)$=1.233, $y(1.2)$=1.548, $y(1.3)$=1.979, evaluate $y(1.4)$ by Milne's Predictor-Corrector method. 7M

6. a) Use Trapezoidal rule to evaluate $\int_0^1 x^3dx$ by considering five sub-intervals. Can you use any other formulae to evaluate the integral? Justify your answer. 7M

   b) Find the first, second derivatives of the function tabulated below, at the point x=1.5. 7M

x:	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$:	3.375	7.0	13.625	24.0	38.875	59.0

7. a) Determine the analytic function whose real part is $e^{-x}(x\sin y-y\cos y)$. 7M

   b) If $f(z)$ is an analytic function of z, prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\log|f'(z)|=0$. 7M

8. a) Evaluate $\int_C \frac{z^3+z+1}{z^2-7z+2}dz$, where C is the ellipse $4x^2+9y^2=1$. 7M

   b) Find the Taylor's series expansion of the function $\frac{z}{(z+1)(z+2)}$ about z=2. 7M

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Code : 1G631

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Strength of Materials-I

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

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1. a) Distinguish between Tensile stress and compressive stress 4M

   b) A steel tube of 30 mm external diameter and 20 mm internal diameter encloses a copper rod of 15 mm diameter to which it is rigidly joined at each end. If, at a temperature of 10^0C there is no longitudinal stress, calculate the stresses in the rod and tube when the temperature is raised to 200^0C. E for steel and copper is 2.0×10^5 N/mm^2 and 1×10^5 N/mm^2. The value of co-efficient of linear expansion for steel and copper is 11×10^{-6} per^{0}C and 18×10^{-6} per^{0}C respectively. 10M

2. a) Differentiate between a point load and a uniformly distributed load. 4M

   b) A Cantilever of length 6 m carries two point loads of 2 kN and 3 kN at a distance of 1 m and 6 m from the fixed end respectively. In addition to this the beam also carries a uniformly distributed load of 1 kN /m over a length of 2 m at a distance of 3 m from the fixed end. Draw the S.F. and B.M. diagrams 10M

3. a) Derive an expression for bending stress at a layer in a beam. 6M

   b) A rectangular beam 300 mm deep is simply supported over a span of 4 m. What uniformly distributed load per meter, the beam may carry if the bending stress is not to exceed 120 N/mm^2? Take $I = 8 \times 10^6$ mm^4. 8M

4. a) Show that for a rectangular section of the maximum shear stress is 1.5 times the average stress. 7M

   b) Derive an expression for the shear stress at any point in a circular section of a beam ,which is subjected to a shear force F. 7M

5. A beam of length 10 m is simply supported at its ends and carries two point loads of 100 kN and 60 kN at a distance of 2 m and 5 m respectively from the left support. Calculate the deflections under each load. Find also the maximum deflection by double integration method. Take $I = 18 \times 10^8$ mm^4 and $E = 2 \times 10^5$ N/mm2 14M

6. What is a Macaulay's method? Where is it used? Find and expression for deflection at any section of simply supported beam with a eccentric point load, using Macaulay's method. 14M

7. a) What is Mohr's stress circle? How is it useful in the solution of stress analysis problems? 6M

   b) A Piece of material is subjected to two perpendicular tensile stresses of 300 MPa and 150 MPa. Determine the normal and shear stress components on a plane, the normal of which makes an angle of 40^0 with the 300 MPa stress. Also, find the result. 8M

8. A bolt is acted upon by an axial pull of 16 kN along with a transverse shear force of 10 kN. Determine the diameter of the bolt required by any three different theories. Elastic limit of the bolt material is 250 MPa and a factor of safety 2.5 is to be taken. Poisson's ration is 0.3. 14M

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Code : 1G632 **R11**

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
II B.Tech. I Semester Regular Examinations, January 2014
Surveying
(Civil)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)
* * * * *

1. a) Explain the obstacles in chaining with neat sketches. 6M

   b) A steel tape was exactly 20 m long at 25°C when supported throughout its length under a pull of 60 N. A line measured with this tape under a pull of 180 N and at a mean temperature of 40°C, was found to be 800 m long. Assuming the tape supported at every 20 m, find the true length of line. Cross sectional area of tape is 0.03 cm^2, Modulus of elasticity of the material of tape is 2×10^5 N/mm^2, Coefficient of linear expansion of tape is 12×10^{-6} per ^0C and Weight of tape is 100 N/cm^3. 8M

2. a) What are the methods of plane tabling? Describe any two methods with neat sketches. 6M

   b) The observed bearings of the lines of a traverse ABCDEA with compass in a place where local attraction was suspected are as follows.

Line	Fore bearing	Back bearing
AB	N 12°45'E	S 13°15' W
BC	N 60°00' E	S 59°15' W
CD	S 37°30' E	N 37°30' W
DE	S 43°15' W	N 44°15' W
EA	N 73°00' W	S 72°15' E

   Find the corrected bearings of the lines. 8M

3. a) Define contour line and contour interval. Explain the characteristics of contour liens. 6M

   b) The following successive readings were taken with a dumpy level and 4 m leveling staff on a continuously sloping ground at common intervals of 20 m.

   0.795, 1.440, 2.025, 2.780, 3.565, 0.325, 1.565, 2.325, 3.445, 0.415, 1.680 (on B).

   The first reading was taken (on A) at a chin age 200 m with RL of 100.00. Make entries in a level book and apply the usual checks. 8M

4. a) Explain briefly the computation of traverse area by departure and total latitudes. 6M

   b) The formation level of a road is at a constant RL of 100.00 m. The ground levels along the centre line of the road are as follows.

Chainage (m)	0	30	60	90	120	150	180
Ground level	102.60	101.80	99.00	100.90	101.50	102.30	101.80

   The formation width of road is 8 m and side slope is 2:1. Compute the volume of earthwork. 8M

5. a) Describe the measurement of horizontal angle using theodolite. 6M

   b) The records of a traverse surveying are as follows.

Line	Length (m)	Bearing
AB	800	90°00'
BC	400	330°00'
CD	?	?
DA	400	150°00'

   Compute the length and bearing of line CD. 8M

6. a) Describe the method of determining the constants of a tachometer from field measurements. 6M

   b) The following observations were taken with a transit theodolite.

Instrument Station	**Staff station**	**Target**	**Vertical angle**	**Staff reading, m**
O	A	Lower	+ 5°30'	0.350
		Upper	+8°30'	3.650

   The RL of instrument station is 100.00. Calculate the horizontal distance between the instrument station and staff and also the RL of staff station A. 8M

7. Two tangents AB and BC intersect at point B at a chainage of 1000 m. The angle of intersection is 150°. Calculate the necessary data for setting out a curve of radius 300 m by the deflection angle method. The peg intervals may be taken as 20 m. 14M

8. a) Explain the basic principle of Electronic Distance Measurement (EDM) 7M

   b) What do you understand by GIS? Explain. 7M

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Code : 1G634

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Building Materials and Construction

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE of the following

All questions carry equal marks (14 Marks each)

* * * * *

1.	a)	What do you mean by stone quarrying?	7M
	b)	Differentiate between clamp burning and kiln burning.	7M
2.	a)	Write about the characteristics of a good tile.	7M
	b)	Write in detail about using gypsum as building material	7M
3.	a)	Write about various methods of manufacture of lime.	8M
	b)	Write about various ingredients of cement concrete briefly.	6M
4.		Classify and describe knots found in timber based on size and quality.	14M
5.	a)	Explain in detail about English bond with neat sketches.	8M
	b)	Explain in detail about Rubble and Ashlar Masonry.	6M
6.		Write about the purpose of a footing and explain Clearly about shallow and spread footing.	14M
7.	a)	What is the purpose of a lintel?	6M
	b)	Write in detail about Queen post trusses with neat sketch.	8M
8.	a)	Write about white washing and distempering.	7M
	b)	Differentiate between plastering and Pointing.	7M

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Code : 1G538

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Electrical and Mechanical Technology

(Civil)

Time: 3 hours **Max Marks: 70**

*Minimum of two questions from each part should be chosen for answering **five** questions*

Use separate booklets for PART-A & PART-B

All Questions carry equal marks (14 Marks each)

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PART-A

1	a)	Explain the operation of three point starter with neat diagram.	7M
	b)	A lap wound DC generator having 80 slots with 8 conductors per slot generates at no load emf of 400 V, when running at 1200 rpm. At what speed should it be rotated to generate a voltage of 220 V on open circuit.	7M
2.	a)	Explain the principle of operation of a transformer.	7M
	b)	Explain different losses present in a transformer.	7M
3.	a)	A 3-phase, 4-pole 60 Hz induction motor has a slip of 3% at no-load and 5% at full load. Find: (i) Synchronous speed. (ii) Full-load speed. (iii) No-load speed. (iv) Frequency of rotor current at stand still. (v) Frequency of rotor current at full load.	8M
	b)	Draw and explain slip – torque characteristics of an induction motor	6M
4.	a)	Explain different torques required for the operation an instrument.	7M
	b)	Explain the operation of permanent magnet moving coil ammeter with neat diagram	7M

PART-B

5.	a)	Why flux is used in welding? What are the essentials of a good flux?	4M
	b)	Describe and differentiate TIG and MIG welding?	10M
6.	a)	Draw a neat diagram of an I.C. engine and explain the functions of different parts.	7M
	b)	Describe briefly the actual sequence of events in the cylinder of a petrol engine working on the four stroke cycle?	7M
7.	a)	State the characteristics of a good refrigerant? List the normal refrigerants used along with their properties.	7M
	b)	What is air conditioning? Draw a line diagram of room air conditioning system and explain its working principle.	7M
8.	a)	Classify air compressors. Describe the working of multi stage reciprocating air compressor.	7M
	b)	State and explain different types of conveyors specifying their uses and limitations.	7M

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Code : 1G633

R11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET

(AUTONOMOUS)

II B.Tech. I Semester Regular Examinations, January 2014

Fluid Mechanics

(Civil Engineering)

Time: 3 hours **Max Marks: 70**

Answer any FIVE Questions from the following

All questions carry equal marks (14 Marks each)

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1. a) Define mass density, weight density, specific volume and specific gravity. The weight of 10 liter of a liquid 70N. Find its mass density, specific weight specific volume.

   b) A cylindrical shaft of 90mm diameter rotates about a vertical axis inside a fixed cylindrical tube of length 50cm and 95mm internal diameter. If the space between the tube and the shaft is filled by a lubricant of dynamic viscosity 2.0 poise, determine the power required to overcome viscous resistance when the shaft is rotated at a speed of 240 rpm.

2. a) Explain about total pressure and center of pressure write its practical applications.

   b) Derive the expression for total pressure for vertically immersed surface and also determine the passion of center of pressure.

3 a) Derive the continuity equation for Cartesian coordinates

   b) A two dimensional flow field is defined by the stream function $\Psi=2xy$. Find the corresponding expression for velocity potential function.

4. a) State and prove Bernouli's Theorem from fundamental principles.

   b) 250 liters per second of water is flowing in a pipe having a diameter of 300mm. If the pipe is bent by 135^0, find the magnitude and direction of resultant force on the bend. The pressure of the water flowing is 400 kN/m^2

5. a) Distinguish between major and minor losses. Explain with neat sketches.

   b) Derive the Darcy's Weisbach equation for turbulent flow through circular pipe.

6. a) Derive the expression for discharge through Venturimeter.

   b) A venturimeter having a diameter of 100mm at the throat and 300mm at the enlarged end is installed in a horizontal pipeline 300mm diameter carrying an oil of specific gravity 0.8. The pressure head recorded by the U-tube manometer connected to the venturimeter is 150mm of mercury. Determine the discharge through the pipe. Assume a coefficient of discharge of 0.97.

7. a) With laminar flow in a circular pipe, at what radial distance from the centre line does the local velocity equal one third the maximum velocity?

   b) An oil of relative density 0.90 flows at a rate of 10.0 L/s through a horizontal pipe of 7.5cm diameter. The pressure drop over a length of 300m of pipe is found to be $40N/cm^2$. Estimate the viscosity of the oil. What is the Reynolds number of the flow?

8. a) What do you understand by dimensional analysis? Explain its utility.

   b) Explain the Rayleigh method of dimensional analysis with an example.

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